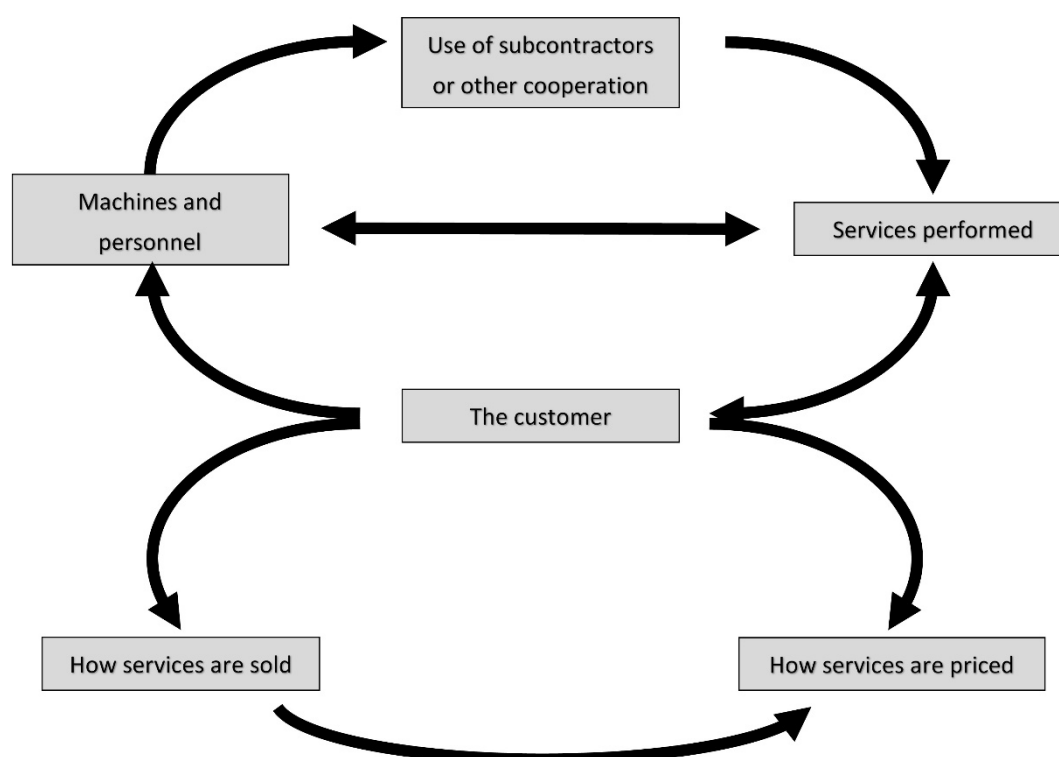


Development of a tool to characterize business models for forestry services

*Utveckling av ett verktyg för att karaktärisera affärsmodeller för
skogliga entreprenadtjänster*

Filip Benjaminsson



Master's thesis • 30 credits

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Filip Benjaminsson

Supervisor:	Emanuel Erlandsson, Swedish University of Agricultural Sciences, Department of Forest Biomaterials and Technology
Examiner:	Dan Bergström, Swedish University of Agricultural Sciences, Department of Forest Biomaterials and Technology
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Swedish University of Agricultural Sciences
Faculty of Forest Sciences
Department of Forest Biomaterials and Technology

Abstract

The Northern Periphery and Arctic (NPA) region is a part of northern Europe with common characteristics of low population density and low economic diversity, but with an abundance of natural resources. The region covers areas in eight countries, of which this study has focused on Sweden, Finland, Great Britain, and Ireland.

Forests constitute a main resource in the region, with potential to create job opportunities. In Sweden and Finland, forestry service contractors have struggled with low profitability. Studies show reasons such as insufficient turnover, and shortcomings in business relationships and operational conditions. There are also identified differences in contractors' business structures. No studies have however targeted their business model design, which has been shown to provide competitive advantages in other industries. Therefore, this study aimed to adapt, validate and evaluate a business model canvas (BMC) for characterization of forestry service businesses by a three-step approach:

- 1) Adaptation: Experts in applying BMCs and in forestry services were interviewed targeting suitable adaptations to forestry.
- 2) Validation: The ability of the adapted canvas to capture variations between contractors and markets was tested by interviewing experts in the focus countries.
- 3) Evaluation: Outcomes were evaluated to adjust and propose a Forestry BMC (FBMC).

Results revealed many similarities and differences, both within and between markets. Commonly, customer companies have a strong influence on business model design. Key differences were found in details of business model components, which motivates the need for a structured tool such as the FBMC to ensure covering of all relevant aspects.

Keywords: contractor forestry, service design, harvesting, silviculture, customer requirements

Sammanfattning

I norra Europas utkant finns glest befolkade områden med låg ekonomisk diversitet men stora naturresurser. Skogsresurserna har stor potential att skapa arbetstillfällen och driva på glesbygdsutvecklingen. Europeiska Unionen (EU) har identifierat områden som uppfyller dessa och några ytterligare kriterier och kallar dem Northern Periphery and Arctic (NPA) region. NPA-regionen innefattar åtta länder varav hälften av dem är EU-medlemsländer och utgör studieområde för arbetet: Finland, Irland, Storbritannien och Sverige.

Skogliga entreprenader i både Sverige och Finland har under en längre tid kämpat med låg lönsamhet, och studier har visat samband mellan lönsamhet och faktorer som kundrelationer, omsättning och kundernas erbjudna arbetsförutsättningar. Studier har också visat skillnader i entreprenadföretagens företagsstruktur. Trots detta har ingen studerat skogsentreprenadens affärsmodeller.

Studier inom andra branscher har visat att affärsmodellens utformning kan ge företag konkurrensfördelar. Denna studies syfte var därför att anpassa, validera och utvärdera ett ramverk för kartläggning av affärsmodeller för skogliga entreprenadtjänster. Detta har gjorts i tre steg:

- 1) Anpassning: Ramverket anpassades genom intervjuer med sakkunniga inom användningen av ramverk för beskrivning av affärsmodeller, samt inom skogliga entreprenadtjänster.
- 2) Validering: Det föreslagna ramverket testades på experter inom skogliga entreprenadtjänster på marknaderna i Sverige, Finland, Irland och Skottland för att undersöka hur väl komponenterna i ramverket fångar variationer i tillämpade affärsmodeller.
- 3) Utvärdering: Resultatet från valideringen utvärderades för att ta fram ett slutgiltigt ramverk för karakterisering av skogliga entreprenadföretags affärsmodeller.

Resultaten visade skillnader i entreprenadföretagens affärsmodeller, både inom och mellan marknaderna. Skillnaderna återfinns ofta i detaljerna, varför ett strukturerat och heltäckande verktyg krävs för att fånga dessa. Vidare pekar studien på att kundföretagen har en stor inverkan på entreprenörernas affärsmodeller.

Nyckelord: entreprenadskogsbruk, tjänstedesign, avverkning, skogsvård, kundkrav

Preface

This is a Master's thesis in Forest science written at the Department of Forest Biomaterials and Technology at the Swedish University of Agricultural Sciences in Umeå.

The study was done within the research project Forest Business Innovation and Advancement in the Northern Periphery (FOBIA). The project is EU funded through the Northern Periphery and Arctic Programme 2014-2020.

I would like to thank all persons connected to the FOBIA-project that helped me in this study, as well as the interviewees who took their time to participate. Your sharing of knowledge made the study into what it is.

A special thanks to my supervisor Emanuel Erlandsson for all the time, support and input you have provided during this process.

And last, but not least I need to thank my girlfriend Anna, who listens to my gibberish and provides good advice when I need it.

Umeå, March 2018

Filip Benjaminsson



Northern Periphery and
Arctic Programme
2014–2020



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1 Background

1.1 The importance of forestry for regional development

1.1.1 Northern Periphery and Arctic (NPA) Region

In the most northern parts of Europe and the northern Atlantic there are sparsely populated areas with low accessibility, low economic diversity, abundant natural resources and high climate change impact (NPA, 2016). The European Union (EU) have identified a number of geographical areas with these characteristics and calls them the Northern Periphery and Arctic (NPA) region (figure 1). Areas in eight countries are included: the EU members Sweden, Finland, Ireland and Great Britain and the non-members Norway, Iceland, Greenland and the Faroe Islands (for specific areas see figure 1).

One of the key factors in building attractive and viable societies is to create job opportunities, for which innovation and entrepreneurship is needed. To successfully run a company within the NPA region is harder considering the low population density and low accessibility, but at the same time there is an abundance of natural resources that can create many job and business opportunities. As many of the NPA regions are rich in forest resources, forestry and its involved services offers an especially large opportunity for increased entrepreneurship. An active local entrepreneurship is also of vital importance for making use of forest resources to fulfil societal needs.

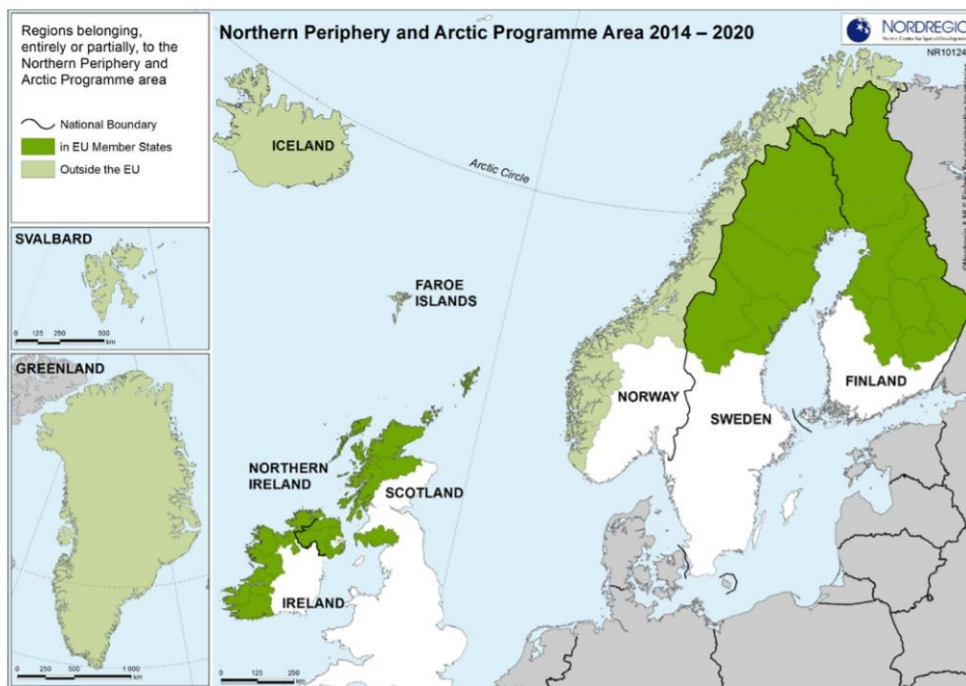


Figure 1. The NPA region. © NORDREGIO 2016.

1.1.2 Forestry and its possibilities

The high demand for forest products creates thousands of jobs in both forestry operations and in the processing of harvested forest resources within the NPA-region, from silviculture and harvesting to hauling and work in the processing industries (Finnish Forest Research Institute, 2014; Swedish Forest Agency, 2014). Meanwhile, there have been several global meetings about climate change during the twenty-first century, resulting in agreements to reduce the emissions of greenhouse gas. For example, EU has set several goals to reduce these emissions, starting with 20 % reduction by 2020 compared to 1990 (European Union, 2017). This has resulted in a boosting bio-based economy, which according to Staffas et al. (2013) refers to the use of renewable raw material and biological resources. The effort to replace fossil-fuels such as coal and oil, and other non-renewable materials such as steel and concrete with bio-based alternatives has resulted in many new products. Two successful innovations using forest resources are “Preem Evolution diesel”, a product made from oil extracted from pine bark (Preem AB, 2017) and “glulam”, a technique for making wooden beams as an alternative to steel (Martinsson, n.d.). An increased sustainable use of forest resources might be a key to continuous growth of the bioeconomy and development of bio-based products.

The ongoing development of new products can be expected to affect the demands regarding the assortments and qualities of the raw material from the forest, as well

as create needs for new forestry or forestry-related services. That will test the forestry contractors' abilities for innovation and adaptation of their enterprises, but it will also open up opportunities to establish new enterprises and create new revenue streams from the forest. Without innovative service suppliers, the necessary supply chains needed for a bioeconomy transformation might not develop in the necessary pace to keep up with developing markets. Thus, contractors have a key role in this transformation.

1.2 State of the art among forestry contractors in the NPA region

1.2.1 Mature markets: the Swedish and Finnish examples

Two of the EU countries within the NPA region, Sweden and Finland, have had large-scale industrial production of pulp and sawn goods since the 19th century (Luke, 2012; Lundmark et al., 2013) and relatively stable annual harvest levels of approximately 70 million and 60 million solid cubic meters respectively (Finnish Forest Research Institute, 2014; Swedish Forest Agency, 2014). Thus, they represent mature markets for forestry services. The large forest industry companies in both countries have outsourced most of the operational work (harvesting and silvicultural services) to contractors, who thus are service entrepreneurs (Uusitalo & Markkola, 2006; Ager, 2014).

In Sweden, forest companies insourced most of the logging operations between 1930-1950 to speed up the technological development. However, during the late 1980s and 1990s the harvesting operations (now mechanised and having reached a mature development stage) were outsourced again, together with the silvicultural services, in order to cut costs, reduce financial risks and decrease the amount of capital tied up in expensive machinery. There was also a desire to use the competitive pressure between contractors as a driver for productivity development (Ager, 2014). This proved to work as intended, but since the beginning of the 20th century productivity development has declined or even stopped, and the greatest potential for continued development now seems to be found in better business relationships and management, rather than technological advancement (Eriksson, 2016). Finland has had a somewhat different development, where contractors owned the forest machines from an early phase in the mechanisation, but the situation today is very similar to the one in Sweden (Uusitalo & Markkola, 2006; Penttinen et al., 2011).

The Swedish forestry service contractors are small- and medium sized enterprises which can be divided into two main groups: harvesting and silvicultural contractors. According to Häggström et al. (2013) 60 % of the professional contractors are mainly engaged in logging, 30 % in silviculture and the remaining contractors claim to be equally engaged in both. They found a clear difference in the number of employees between different groups: in the harvesting group, having 2-4 employees (including the owner) was the most common and those contractors accounted for 42 % of the worked hours, while in the silviculture group one-man contractors were the most common, but contractors with more than 9 employees (averaging 34) accounted for 50 % of the hours. Thus, harvesting contractors are generally smaller companies than silvicultural ones in terms of employees, but both vary in the range of services they offer. There is a tradition in Sweden to write long-term contracts, often renegotiated once a year, in order to lower the contractors' risks and thereby enable a low price level for the service buying companies (Norin & Furness-Lindén, 2008). There are many similar indicators of customer companies dictating or strongly influencing the market conditions for the service providers (cf. Erlandsson, 2013; Ager, 2014; Eriksson, 2016).

In general, forestry contractors operating on the mature Nordic market have struggled with low profitability for a long time. However, there is large variation in profitability between them, where several still have managed to keep a stable profitability with higher results than others (Berg, 2009; Penttinen et al., 2011). Some studies have also aimed to identify success factors for profitability, and found significant effects of well-working relationships with customers and their provision of good production conditions (cf. Mäkinen, 1997; Eriksson, 2016; Eriksson et al., 2015, 2017; Erlandsson & Fjeld, 2017). Penttinen et al. (2011) have also indicated an effect of company size (represented by turnover) on profitability which also hypothesized that there is advantages with economies of scale.

1.2.2 Growing markets: the Irish and Scottish examples

In the other two EU countries within the NPA region, Ireland and Scotland, there is not the same tradition of forestry as in the Nordic countries and there is not much research on the forestry contractors operating on these markets. Due to industrialisation and population growth there were not many forested areas left in Ireland in the beginning of the 19th century (Department of Agriculture, Food and the Marine, 2008) and in Scotland only 5 % of the land was covered by forest in the beginning of the 20th century (Skogssällskapet, 2015). However, both countries have had extensive afforestation programs during the 20th century and now Scotland has a

forest cover of 17 % (Skogssällskapet, 2015) while Ireland has 10.5 % coverage (Department of Agriculture, Food and the Marine, 2017). In relative numbers this means a very fast and extensive rise of the forestry sector in Ireland, with an annual harvest of 3.25 million solid cubic meters which is 10 times higher than 40 years ago (Department of Agriculture, Food and the Marine, 2016).

There is however very little literature describing what this has meant for the development of job opportunities in the sector, and for the growth and status of the forestry service business's. With such positive trends and few established business structures, there is great potential to benchmark the existing mechanisms for innovation and business practices between such growing markets and the Nordic mature ones.

1.3 Business models – the way of successful forestry contractors?

1.3.1 Business models in the forestry service sector

Earlier studies (described above) describe different business structures and the importance of both managerial and relationship factors for successful forestry contractors. This indicates variation in the deployment of contractors' business strategies. More detailed studies about these variations in terms of applied business models have however not been made.

There is no commonly accepted definition for the term “Business model”, even though the term itself was introduced already in 1957 by Richard Bellman et al. (Wirtz et al., 2016). Magretta (2002) describes a business model as a story that describes how the business works: Who is the customer? What problem does the customer have? How do we solve the problem and make money out of it?

But what components are to be included in a business model? Literature reviews by Wirtz et al. (2016) and Morris et al. (2005) shows a large variation of components included in business models, but none were included in all articles studied. One of the reasons according to Wirtz et al. (2016) is the heterogeneity of the abstraction among the authors where some only include two or three components in their models, while others includes as many as eight or nine. According to Morris et al. (2005) the most commonly mentioned component is *the firms value proposal* followed by *economic model*, *customer interface/relationship* and *partner network/roles*.

An example of a business model structure is Boon & Lüdeke-Freund (2013), who distinguish four components: Value proposition (the value offered to the customer), Supply chain (relationship with and management of suppliers), Customer interface (relationship with and management of customers) and Financial model (structure of benefits and costs in the business). One could argue that something is missing, or that a component should be split into smaller parts for higher resolution (the academic world has not agreed on a definition yet).

A commonly applied structure today is the Business model canvas (BMC) presented by Osterwalder and Pigneur (2010). Their goal was to present a model that was simple to understand and use, yet covering all the relevant aspects of a business model. Their solution was a model, or a canvas as they call it, consisting of nine components that should answer a number of questions about a company's business model (figure 2). The BMC is user-friendly but general, in order to be useful in any industry. It has been applied to several areas spanning from e.g. the pharmaceutical industry (Syrovatka, 2011) to urban forestry (Parra, 2017), but to our knowledge it has not yet been applied in the forestry service industry.

1.3.2 Why is the business model design important?

Zott et al. (2008) claim that a business model that creates greater value than the competitors can give a competitive advantage, although the business model itself is no guarantee for success. Teece (2010) agrees that the business model can create an advantage, but points out that it must be hard to replicate to give a lasting advantage.

More specific for the forestry service sector, what business model designs are being used to create competitive advantage remains to be studied. Based on earlier studies and experiences there also seems to be strong influences from customer demands on business model adoption in the Nordic countries. How business models are designed and how they are influenced by these demands is important to study for a more complete understanding of the potentials and restraints for the innovativeness needed within the sector to meet the service demands rising in the growing bioeconomy. Comparing the mature Nordic markets with the emerging Scottish and Irish markets could be a way of studying this, by providing a benchmark for identifying key elements for how a business model can be best adapted to the market opportunities.

Key Partners <ul style="list-style-type: none">Which are the most important partnerships to make the business model work?	Key Activities <ul style="list-style-type: none">Which are the most important activities to make the business model work?	Value Proposition <ul style="list-style-type: none">How do we create value for the customer?How do we differentiate from the competition?	Customer Relationships <ul style="list-style-type: none">What relationship do we have to each customer segment?	Customer Segments <ul style="list-style-type: none">Who are the customers?Who is the most important customer?
	Key Resources <ul style="list-style-type: none">Which are the most important assets to make the business model work?		Channels <ul style="list-style-type: none">How do we communicate/interact with our customers?	
Cost Structure <ul style="list-style-type: none">Which costs are there for running the business model?			Revenue Streams <ul style="list-style-type: none">What are the customers paying for?How are they paying for it?	

Figure 2. The business model canvas with a summary of the questions it contains (Osterwalder & Pigneur, 2010).

1.4 Aim

The aim of this study was to adapt, validate and evaluate a Business model canvas specifically for forestry services. This was done by identifying key components in forestry service contractors' business models, and phrase key questions for capturing and comparing contents of the components.

The goal of the study was to develop a framework for mapping differences in forestry service business models, both within and between countries. The study was conducted as a part of the FOBIA-project within the EU NPA-programme, with partners in Sweden, Finland, Ireland and Scotland. The project studies, among other aspects, the characteristics and business models of harvesting- and silvicultural contractors. This study has therefore been delimited to these two types of services and the NPA areas of the FOBIA partner countries.

2 Material and methods

2.1 Study structure

Osterwalder and Pigneur's (2010) Business model canvas (BMC) was used as the starting point when adapting a BMC for forestry services, in order to tailor a Forestry BMC (FBMC). The adjustments and the evaluation were made according to the following three-step structure:

1. Adaptation of a BMC to a forestry context
 - a. Identifying key components and key question areas
 - b. Test and completion
2. Validation of the FBMC in the four case countries
 - a. Selection of respondents
 - b. Interviews
 - c. Extracting data from the interviews
3. Evaluation
 - a. Comparison of similarities and differences within each component
 - b. Evaluation of the potential of each component to capture variation

In total, ten interviews were held during the two first steps. All interviews were conducted by phone or by Skype. The interviews were recorded using a smartphone application (Voice Recorder), to enable listening to them again. Notes were taken continuously during the interviews. Complete transcriptions of recorded interviews were not considered necessary, as only very specific content was targeted in each interview, which could be compiled into list structures based on the BMC/FBMC structure while listening to the recordings.

The three steps are described one-by-one in the following text.

2.2 Adaptation of a BMC to a forestry context

2.2.1 Identifying key components and key question areas

To identify key components to include in the canvas, a FOBIA-connected researcher experienced in applying Osterwalder & Pigneur's (2010) BMC in an agricultural context was interviewed. The purpose of the interview was to get input on 1) how to adapt the BMC, and 2) how to operationalize the BMC for interviews. During this first interview, the interviewee first spoke freely about his experience in using the BMC and then about possible adaptations of the components in the BMC. Supplementary questions were asked to make the interviewee develop his thoughts, to give as deep an understanding of the subject as possible. The information gained from the interview was used to make a first adaptation of the components and question areas in the BMC to fit a forestry service context.

A second interview was then conducted with a co-worker at an association of forestry contractors with extensive experience of working with forestry service contractors within the Swedish NPA area. The purpose of the interview was to 1) present the adapted components in the canvas and receive input on their coverage of the business models applied among forestry service contractors, and 2) discuss how the components could be broken down into more specific questions enabling capture of each component's content. The adapted BMC was used as starting point for the interview. The structure of the interview followed Kylén's (2004) so called funnel design, where the interviewee first speaks freely and broadly about a subject and then supplementary questions are asked to narrow the discussed subject down into specifics and examples. This was done for each component in the BMC and aimed to identify missing content.

The interview with the researcher was conducted in English, a foreign language for both interviewee and author. The second interview was conducted in Swedish, the first language of both parts. The interviews were 58 and 65 minutes long respectively.

After analysing the combined content of the two interviews, key components in a forestry service business model were identified and a refined version of an adapted BMC was compiled. Based on the input from interviews, the components were then broken down into key questions to capture the content of the components. To operationalize the FBMC for interviews with experts, the component questions were re-phrased for targeting variation in key question areas on a market level rather than

on the original contractor level. The expert questions were summarized into an interview guide (see appendix 1, including minor changes as mentioned in the next section) in order to enable simple interviews without the complexity of having to explain the BMC structure to interviewees.

The finalized interview guide was checked by sending it to the interviewed researcher and the co-worker at the association of forestry contractors, in order to get feedback on the adaptations that had been made and the overall content and formulations. Minor changes were made based on their feedback.

2.2.2 Test and completion

Before applying the interview guide on market experts, it was tested on another, not previously involved, co-worker at the same association of forestry contractors as the previous interviewee. The purpose with this test interview was to:

1. Test if the questions were understandable or needed adjustments.
2. Test the interview design.
3. Test the time length of an interview.

The interview guide (appendix 1) was sent to the interviewee a couple of days in advance. The interview guide contained both qualitative and quantitative questions and it was considered important to give him the time to think through the questions and look up facts which he may be uncertain of.

The funnel design described by Kylén (2004) was considered suitable for this interview as well. The structure of the interview followed the interview guide and the answers to each question were checked by control questions to narrow down the answers. The interview ended with asking the interviewee if he considered the subject to be well covered by the interview or if any additional parts (referring to components) or questions should be included. The interview lasted for 73 minutes.

The recorded interview was afterwards listened through to evaluate both the clarity of the questions and the interview design, in order to make necessary final adjustments for the coming interviews. Adjustments were only made of phrasings, and none of content.

2.3 Validation of the FBMC in the four case countries

The FBMC was validated by applying the interview guide (expert questions, see appendix 1) on the forestry service markets of Sweden, Finland, Ireland and Scotland. Seven semi-structured interviews were conducted. Two interviews were conducted in each country except in Scotland where only one interview was conducted due to identification of a general expert able to cover both service perspectives. One of the interviewees in each country was asked to describe the situation for the harvesting contractors and the other to describe the situation for the silvicultural contractors. In Scotland the interviewee was asked to answer for both groups.

2.3.1 Selection of respondents

The low number of interviews made the selection of respondents extra important. The goal was to interview two representatives for each market, preferably one with expert knowledge in harvesting and one in silviculture. The respondents were chosen through what Kotler et al. (2005) refers to as a judgement sample. In this case that meant that researchers connected to the FOBIA-project in each of the four countries were asked to aid in finding and contacting respondents having the relevant expertise in their market.

The instruction to the researchers was that two respondents per country were needed and that they should be experts in harvesting- and silvicultural services respectively. Contractors were not considered the most suitable as it was an evident risk that they would answer in a limited context of their own company or local market. It was considered more suitable to interview representatives from forestry associations, as they were assumed to have a more complete picture of markets and variations in a nation-wide perspective and possibly also be more familiar with the business model concept.

The suggested respondents were first approached by the local FOBIA researcher to see if they were interested in participating in the study. It was considered more likely that they would be positive to participation if they were approached by a local researcher rather than by an international master thesis student.

After they had agreed to participate, the interviewees were contacted by the author. The purpose of the interview, the areas of interest and the expected length (between 60 and 90 minutes) of the interview was explained. Then date, time and way of communication for the interview was agreed upon.

2.3.2 The interviews

The interviews followed the same design as the test-interview: the interview guide (appendix 1) was sent out a couple of days in advance and the interviews were conducted using the *funnel design* (Kylén, 2004).

All interviews were conducted in English except the two in Sweden which were conducted in Swedish (since it was the first language for both parts). English was the first/second language of the interviewees in Ireland and Scotland while it was a foreign language for the interviewees in Finland. The length of the interviews varied between 60-85 minutes.

When listening through recordings afterwards, some lacking information was identified which was complemented by sending some of the interviewees supplementary questions by e-mail to complete the answers from the interview.

2.3.3 Extracting data from the interviews

The data from the interviews were extracted by listening through the interview recordings. The eight interviews provided nearly ten hours of audio material. Parts relevant to the questions were compiled into lists. These lists in combination with the notes taken during the interviews was used as data to fill in the FBMC.

The result was eight filled-in structures of the adapted FBMC, one for harvesting contractors and one for silvicultural contractors in each country and consisting of one page of synthesised answers to the questions in the FBMCs. The data from each framework was gathered from the interviews in that country and mainly from the interviewee specialised in either service markets (harvesting or silviculture), but information from interviews was partly also combined as the interviewees had knowledge of the entire forestry service market. The two frameworks regarding the Scottish market is based on the single interview which was divided into covering one service market at a time.

The frameworks are mainly captures of the interviewees' personal knowledge and experiences of the markets, and thus risk to be partly subjective. Therefore no statistical or other numerical analyses was made to identify and describe differences.

2.4 Evaluation

2.4.1 Comparison of similarities and differences within each component

In the first part of the evaluation, the resulting and completely filled-in FBMCs after interviews were analysed and compared in order to pin-point similarities and key differences between the markets for each component. The causes for identified key differences were further analysed by reviewing the interview material and interviewees' answers to questions about why things were done the way they were. Also, similarities and differences between harvesting and silviculture were compared, both within and between countries, in order to deepen the understanding of different business model structures and their causes.

2.4.2 Evaluation of the potential of each component to capture variation

In the second part of the evaluation, the extent of differences within each component was analysed in order to identify which components are likely to be the most valuable for capturing variation between markets and contractors

3 Results

3.1 The adapted FBMC

During the adaptation of a BMC into a tailored Forestry Business model canvas (FBMC), the amount of components were reduced from the original nine down to six covering the most relevant aspects identified through the initial interviews. Each component was broken down into between two and five questions to capture the business information that the component is supposed to cover, thus enabling interviews based only on the questions without requiring interviewees to have knowledge of the FBMC or the business model concept. To validate the FBMC, the questions were adapted to capture variation when interviewing forestry service experts and those adapted questions were compiled into an interview guide (appendix 1). The content of each component is presented below and both the FBMC questions and the adapted expert questions are presented in table 1.

3.1.1 FBMC components

Services performed in the market should explain which services the contractors offer to the customers, and establish the degree of involvement in forestry services compared to services in other business areas (if any). Potential factors affecting the contractor's service design should also be covered.

The customer should explain who the contractor's main customer or customers are, how many customers the contractors have and potential factors affecting the number of customers.

How services are sold should explain how services are being sold regarding purchase method, contract length and why the services are being sold this way.

How services are priced should explain how prices are set for the services and if there is anything that enables the contractor to receive a higher price or additional payments.

Machines and personnel should explain the important assets and costs in forestry service companies, focusing on machinery and personnel.

Use of subcontractors should explain the use of subcontractors or other cooperation, and the relationship structure between the contractor and subcontractor.

Table 1. The constructed questions. The tailored FBMC components are bold and the original BMC components they cover are written within parenthesis

Key questions included in the FBMC	Validating questions for the experts
Services performed in the market (Value Proposition, Key Activities)	
<ul style="list-style-type: none"> • What services does your company offer? • To what degree is your company engaged in forestry services? Do you perform non-forestry services? • What affects your choice of service design: your preferences, the demand, customer requirements, the company's economy, or other factors? 	<ul style="list-style-type: none"> • What are the MAIN differences between the contractors, regarding the services they offer, the degree of specialization and their mix of services? • To what degree are the contractors engaged in forestry services? From purely engaged in forestry services to combinations with other business areas. • What affects the contractors' choice of service design: both internal and external conditions.
The Customer (Customer segments)	
<ul style="list-style-type: none"> • Who are your company's MAIN customer? • How many customers does your company have? • What affects the number of customers: your choice or other factors? 	<ul style="list-style-type: none"> • Who are the MAIN customers that buy forestry services? • How does it differ in how many customers the contractors have? • What affects the number of customers: the contractor's choice or other factors?
How services are sold (Customer Relationship, Channels)	
<ul style="list-style-type: none"> • How does your company sell services in terms of purchase methods and contract lengths? • Why do you sell them that way? 	<ul style="list-style-type: none"> • What differences are there in how services are sold? • Why are forestry services sold in this way?
How services are priced (Revenue Streams)	
<ul style="list-style-type: none"> • How are prices set? • What can you do to get paid extra/get a higher price? 	<ul style="list-style-type: none"> • How are prices set? • What can the contractor get paid extra for?
Machines and personnel (Key Resources, Cost Structure)	
<ul style="list-style-type: none"> • How many employees do you have? • Are they employed full-time or seasonal/temporarily? • Are the employees domestic or foreign? • How many machines does your company have? How specialized are the machines for a certain kind of service? • What affects your choice of machinery: your preferences, the demand, customer requirements, the company's economy, or other factors? 	<ul style="list-style-type: none"> • What is the variation in number of employees? Does it differ depending on the services the contractor offers? • Are they employed full-time or seasonal/temporarily? Does it differ depending on the services the contractor offers? • Are the employees domestic or foreign (and does that differ depending on the type of services they offer)? • If they have machinery: How many is typical and what is the variation in numbers? How specialized is the machinery for a certain kind of service? • What affects the choice of machinery: the contractor himself, uncertainty in demand, customer requirements, the contractor's economy, or other factors?
Use of subcontractor (Key Partners)	
<ul style="list-style-type: none"> • Do you use subcontractors or cooperate with other contractors? • If so: is it long- or short-term arrangements? • How do you buy/negotiate those services? 	<ul style="list-style-type: none"> • Is it common to cooperate with or buy services from other contractors? • If so: is it long- or short-term arrangements? • How do they buy the services?

3.2 Evaluation of the test per component

3.2.1 Services performed in the market

Harvesting contractors in all four countries were described as mainly engaged and specialized in forestry services with no or little engagement in other types of services. The normal service offer is thus limited to harvesting and forwarding in thinning and final felling. According to all interviewees, harvesting contractors normally do not perform silvicultural services, but in Sweden soil preparation was described as commonly performed by a harvesting contractor with a scarifier mounted on a forwarder. In Finland, interviewees also considered there to be a growing trend of harvesting companies offering silvicultural services, but those services are then subcontracted to other contractors. The service design was considered to be mostly affected by the demand for services, but other reasons also mattered. Especially important were customer requirements, which was an important reason for Finnish harvesting contractors also providing silvicultural services. Also, the contractors' specific operational competence mattered, for example in the case of Swedish harvesting contractors conducting soil preparation.

Based on interview answers, the silvicultural contractors seem to be a far more diverse group than the harvesting contractors. In large parts of Sweden and Finland they are often restrained to seasonal forestry services, and thus might also perform non-forestry services during periods of snow cover and ground frost. In Ireland and Scotland, silvicultural contractors can do forestry services year-around even if specific services depend on the season. Still, interviewees described that it is a common for contractors to combine forestry services with other services such as agriculture and landscaping. The service design seems to be somewhat dependent on the contractor's company size, where bigger contractors generally offer more services. It also seems to depend largely on the customer: the bigger the customers, the more the customers' demands and requirements matter. Contractors working directly for small-sized customer companies seem to perform only the services they have competence for.

One of the interviewees said "it's hard to be an early adopter in forestry", pointing towards that the forestry industry is conservative and possibly hampers the innovation capacity among the contractors.

3.2.2 The customers

The harvesting contractors' customers seem to vary between the countries. In Sweden and Finland harvesting services were described to be almost exclusively sold to forest companies, and in these two countries there are many large service-buying customers. The situation in Ireland was described similarly, but they only have one major large customer (Coillte, the state forest owning company) who buys most of the services and only a few smaller customers. In Scotland the biggest customer is the Forestry commission, followed by milling companies, then management companies that mediate forestry services to forest owners, and finally private forest owners buying services directly from contractors. Generally in Scotland, there are many yet mostly smaller customers. In Sweden, Finland and Ireland the big customers were described as often offering the contractors full time employment. Interviewees in all three of these countries explained that it is common to have only one customer and that is also considered most desirable. In Scotland, where the customers are generally smaller, it was instead described as common to have a few different customers.

Based on the interviews, the silvicultural contractors' customer market seems quite different from the harvesting contractors in Sweden and Finland, as *both* forest companies and private forest owners are common customers. In Ireland and Scotland, the customer market is more similar to that of the harvesting contractors'. In Ireland this could be due to strict regulations and grants, making it very complicated to not buy services through an educated professional forester. Regarding the number of customers, the contractors working directly for private forest owners need more customers the bigger they are, but big contractors often seem to work for forest companies and therefore only have one or a few customers.

3.2.3 How services are sold

The way services are being sold often depends on the customers. In Sweden, Finland and among the big customers on Ireland, interviewees explained that it is normal to sign long-term contracts ranging from one to five years regarding a given harvesting volume per year. Smaller Irish customers are however an exception that normally buy services per assignment. It is common to tender for these contracts. In Scotland, where contractors often seem to trade with timber themselves, the interviewee described that it is common to have long contracts with customers that guarantee the contractor to buy a share of their harvested volume. Tendering is also common in Scotland, but they often tender for single projects instead of large volumes per year as in the other countries.

The forest companies are working with silvicultural contractors in a similar way as with the harvesting contractors, by normally using contracts for a season or more and procuring by tendering. A big difference seems to be contractors working directly for private forest owners in Sweden and Finland. These customers normally contract per assignment and contact contractors to get a price estimation and agree on payments.

According to all interviewees, tendering has become an increasingly popular way for the customers to find the most attractive price levels, which translates into perceived price pressures on all markets. Worth noting though, is that there are big state-owned forest companies which are required by laws of public procurement to use tenders in three of the countries except for the state-owned company in Sweden.

3.2.4 How services are priced

The pricing of harvesting services was described very similarly in the four markets and the most common way of getting paid seems to be piece work rates per cubic meter with adjustments for various production factors. There are exceptions, for example smaller forestry companies in Ireland that hires and pays per assignment only, and Scottish contractors that trade with timber.

The pricing of silvicultural services seems to vary more, but contractors with long-term contracts were still described as often being paid by piece work rates per hectare or seedling. However, when working for private forest owners in Sweden and Finland, or taking single assignments in Ireland or Scotland, it seems more common to get paid per assignment. According to the interviewee in Scotland, hourly rates may be used in these cases.

The general opinion during the interviews in three countries, except Finland, was that self-propellant, reliable contractors with high quality might have an advantage when they negotiate with the customer and might be able to claim a higher price or at least have a better chance to get hired.

3.2.5 Machines and personnel

Harvesting contractors in all studied countries were described as generally being small companies often owning one to three machines, but there are also some bigger ones with 30-50 machines. The personnel is normally domestic, educated in forest operations and employed year-around. The machines used are mostly wheeled harvesters and forwarders, but in Ireland and Scotland it also seems common to used

tracked excavators for harvesting in steep terrain. This indicates contractors specializing in these types of operations. Based on the interviewed experts' views, the largest variation seems to be in Sweden when it comes to the size of used machinery, where machines are more specialized for certain kind of harvesting objects. In the other countries the machinery trend seems to go towards medium sizes, to be able to handle as many kinds of objects as possible. It however seems that bigger contractors have more specialized machines than smaller ones.

Silvicultural contractors in Sweden and Finland were described as having quite similar company structures with a big variation in the number of employees, ranging from one-man businesses to contractors having more than 50 employees. The smaller ones seem to be the most common. In Sweden the majority of the silvicultural workers were described to be foreign while they seem to be mainly domestic in Finland. They are normally seasonally employed in both countries due to snow and ground frost restraints during winter. In Ireland and Scotland small contractors were also described as most common, but the biggest contractors seem to be smaller than in the Nordic countries with up to 20 and 10 employees respectively. Similarly to Sweden it seems common with foreign workers, but in Ireland and Scotland they seem to more often be employed year-around and switching services depending on season.

3.2.6 Use of subcontractors

In both Sweden and Finland the interviewees considered it very common that a contractor with a harvester subcontracts a forwarder to fulfil his/her contract. In these cases it is mostly long-term arrangements. As mentioned before, it also seems to be increasingly common that Finnish harvesting contractors subcontracts silvicultural services due to customer requirements. In Ireland and Scotland it seems more uncommon with subcontracting among the harvesting contractors and when it happens it is mostly short-term arrangements.

According to the interviewees regarding silviculture, it is common in Sweden that one-man cleaning contractors cooperate with each other in long-term arrangements. In the other countries it seems uncommon with similar subcontracting or cooperation between silviculture contractors, and when it occurs it is mostly short-term.

Common for the subcontracting/cooperation seems to be that the terms are negotiated between the contractors without involvement of the customer.

4 Discussion

4.1 Evaluation of the results

4.1.1 Evaluation of the potential of each component to capture variation

The goal of the component *services performed* in the market was to capture the contractors' service design, engagement in forestry services and factors affecting the service offer. The results indicate that there are variations between the contractors, even though it varies more among the silvicultural contractors than among the harvesting contractors. Many of the interviewees claimed that customer demands and -requirements are important factors for the choice of service design.

The *customers* component goal was to identify the customer market, the number of customers a contractor has and what affects that number. The identified customers can be divided into three groups: big companies, small companies and private forest owners. The results point towards that the proportion of provided services purchased by different customer groups varies extensively between the markets. Within the Swedish and Finnish markets there are even variations in these proportions between harvesting- and silvicultural services. This indicates that the contractors have different contextual conditions depending on what market they are active in, and what services they offer. The variation within the different markets varies, but since results in many of the other components seem to be closely connected to the customer demands and requirements, even small variations in who the customer is might be largely important for the content of many of the other business model components as described below.

How services are sold was meant to capture procurement methods and contract lengths used in the markets and why these are used. According to the results the customers often set the terms for how they buy services. This indicates that *How services are sold* is largely dependent on the results in *The customer*. The results indicate that there is variation in contract lengths and purchase methods in all markets, but they also indicate variation in the combination of contract length and purchase method; tendering, for example, occurs for both long- and short-term contracts.

How services are priced was meant to explain how prices are set and what a contractor can do to affect the price level or other added payments received from the customer. Even if the results indicate that a piece-work rate may be the most common way of pricing in the studied markets, there is some variation such as price per hour or per assignment. There seems to be a link between chosen pricing method and who the customer is, and also between pricing and the contract-length.

The question in the interview guide (appendix 1) that was used to investigate contractors' possibilities to earn a higher price was misinterpreted in several of the interviews and had to be explained. It is therefore important to revise the question phrasing in order to capture the subject correctly.

Machines and personnel was meant to capture the contractors' important assets and costs, focusing on machines and personnel. The questions capture variations in the answers, both within and between the markets, but the component needs some adjustments. The question regarding domestic or foreign workers captures a variation, but to what end? A more interesting subject would be to ask about the available recruitment base, the requirements for competence, educational levels and spoken language, salary levels, and other similar factors.

The goal of the component *Use of subcontractors* was to identify relations between contractors in form of subcontracting and cooperation. The results indicate that subcontracting occurs on the forestry service market, although to different extension depending on what market is studied, and seems more common in the Nordic markets than in Ireland and Scotland. Also, other types of close cooperation existed, but was not formalized by sub-contracts, which motivates an addition to the component name: *Use of subcontractors or other cooperation*.

4.1.2 The impact of components on each other

The similar descriptions given by interviewees clearly revealed that the components in forestry service business models are directly or indirectly connected and affect each other in different ways: *services performed* affects potential customers in *the customer*, but *the customer* also affects the *services performed* by the contractor through specific demands and requirements on the service. *The services performed* also affects the contractors' *machines and personnel* by requiring specific machinery and competencies, but at the same time the *machines and personnel* that are available to the contractor also limit the *services performed* by the contractor. The choice and composition of machines and personnel is also affected by *the customers'* demands and requirements. The lack of required (or demanded) *machines and personnel* leads to a need to use of *subcontractors or other cooperation*, which in turn affects the possible *services performed* by the contractor for *the customer*.

The customer largely affects the terms for *how services are sold*, which affects *how services are priced*. *How services are priced* is also in most cases dictated directly by *the customer*. These connections reveal a rather complex network where *the customer* has a direct or indirect effect on the design of all components in the business model. The connections between the components are illustrated in figure 3.

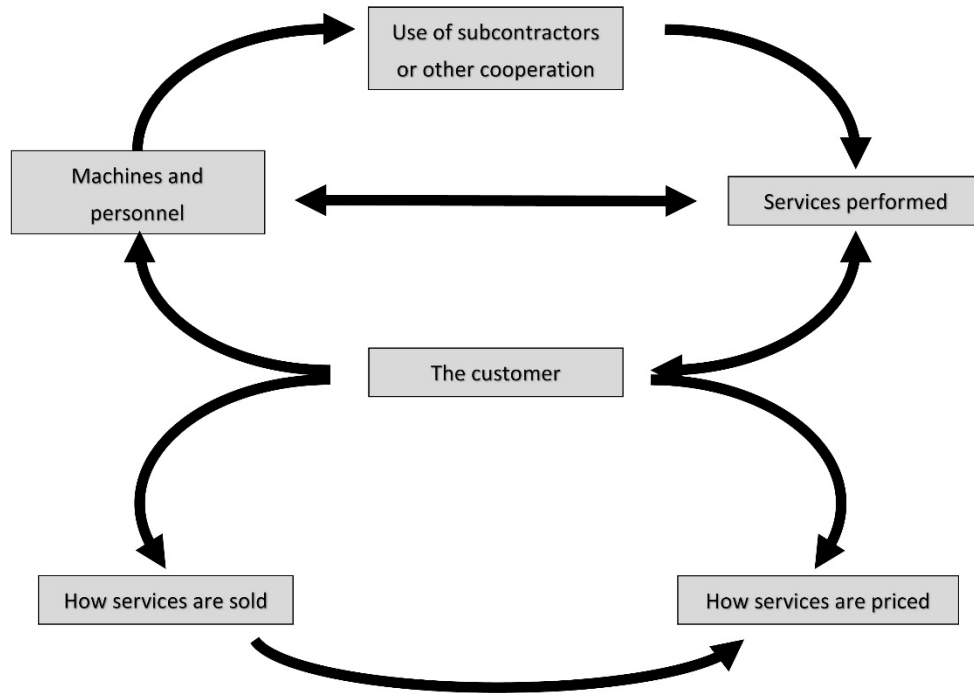


Figure 3. An illustration of the connections between the components in the business model design. The component an arrow originates from affects the component the arrow is directed against. Doublet directed arrows indicate that both components affect each other.

4.1.3 Proposed FBMC

The final proposition of the FBMC contains some changes from the FBMC proposed in table 1 (see figure 4). The biggest change is that *machines and personnel* was split into two components: *machinery and personnel*. The reason was that the previous component became too extensive and the subject was considered to be important enough for two components. The *Machinery* component consists of four questions, one new (whether they need machines or not) and the two questions regarding machinery from table 1, but the question regarding number of machines and specialisation has been split into two separate questions. The *personnel* consist of three questions. One of the questions (regarding the originality of the workers) was rephrased to capture what competences the contractor requires when hiring and the effect on the recruitment base according to the reasoning in section 4.1.1.

Two of the components' names were rephrased. These were *Services performed* (earlier *Services performed in the market*) since the questions are to be asked to a contractor about their specific services without a direct interest of the market, and *Use of subcontractors or cooperation* (earlier *Use of subcontractors*) in accordance to the reasoning in section 4.1.1.

The question *How does your company sell services?* in *How services are sold* was split to clarify that both procurement method and contract-length was asked for. *How services are priced* was supplemented with a question regarding why the services are priced as they are.

Beyond these, adjustments have only been made on phrasing to clarify the questions, and no content has changed.

Use of subcontractors or other cooperation <ul style="list-style-type: none"> • Do you use subcontractors or cooperate with other contractors? • If so: is it long- or short-term arrangements? • How do you buy/negotiate the terms for those services? 	Machinery <ul style="list-style-type: none"> • Do you need machinery? • How many machines do you have? • How specialized are the machines for a certain kind of service? • What affects your choice of machinery: Your preferences, the demand, customer requirements, the company's economy or other factors? 	Services performed <ul style="list-style-type: none"> • What services do you offer? • To what degree are you engaged in forestry services? Do you perform non-forestry services? • What affected your choice of service design? Your preferences, the demand, customer requirements, the company's economy or other factors? 	How services are sold <ul style="list-style-type: none"> • How do you sell your services to customers, regarding purchase method? • How long contracts do you have? • Why do you sell the services this way: because of your own preference or the market conditions? 	The customers <ul style="list-style-type: none"> • Who are your MAIN customers? • How many customers do you have? • What affects the number of customers: your own preference or the market conditions?
	Personnel <ul style="list-style-type: none"> • How many employees do you have? • Are they employed full-time or seasonal/temporarily? • What competences do you require when hiring and how does that affect your recruitment? 			
How services are priced <ul style="list-style-type: none"> • How is pricing done? • Why are services paid this way: because of your own preference or the market conditions? • What can you do to get extra payed/get a higher price? 				

Figure 4. The final proposition of a FBMC consisting of seven components and key questions to capture the most relevant content of each component for comparative purposes .

4.2 Strengths and weaknesses of the study

4.2.1 The FBMC

As there is no clear definition of the term business model, the specific choice of Osterwalder & Pigneurs (2010) BMC as the starting point for this study was done due to its widespread and well-established use. It also had the advantage of being easy to understand and use, partly due to the graphic illustration of the model (probably one of the reasons why it is commonly used).

4.2.2 Terminology

Every industry develops a technical language, and forestry is no exception. The technical language is an important aspect in this kind of study, and one needs to be especially aware that there are differences in the technical language used in different countries (or markets); for example the Swedish definition of a harvesting contractor seems to be much stricter than the Scottish definition. It is easy to assume that the technical language is the same in all the markets. When conducting interviews it is both possible and necessary to make supplementary questions if it is suspected that the definitions vary, but if a survey would be conducted by questionnaires it is of high importance to make sure that the questions are correctly understood. Therefore, it can be strongly recommended to test a trans-national survey on each included market and make follow-up interviews to evaluate the interpretations made by respondents and ensure consistent understanding.

4.2.3 Selection of respondents

A non-probability sample was necessary when conducting as few interviews as in this study. To use the FOBIA-connected researchers to do a judgement sample (Kotler et al., 2005) gave access to networks in the markets that the author otherwise wouldn't have had any connection to, and also ensured that the respondents had a suitable background. Due to the lack of associations of forestry contractors in Scotland and Ireland, the respondents in those markets were co-workers at forestry service buying companies. Even though they were not the preferred choice of respondents, they had experience from working with many contractors and were therefore considered able to give valuable input to the study. However, they had a different perspective than the association co-workers who were interviewed in the other countries, and thus there is a risk of missing some relevant information.

Another detail worth mentioning was the instruction to the researchers that the respondents should be “experts in harvesting- and silvicultural services”. Several of the respondents agreed to participate after pointing out that “I am no expert”. By asking them to answer as experts they might have felt forced to be able to answer the questions, and thereby made them less willing to participate. If a more careful wording such as “persons with good knowledge and/or experience in harvesting- and silvicultural services” would have been used it might make the targeted respondents more willing to participate.

4.2.4 Data quality

With interview data from only one respondent per market, consisting of this individual’s personal knowledge and experience from his or her market, the answers cannot be considered as facts. It can however be considered likely that a person with extensive experience of working in an industry can provide a good indication of where variations are to be found. With the goal to identify variation in the business model, both association- and customer co-workers should thus be able to contribute with credible knowledge and information. However, there is an evident risk that their different perspectives might cause different biases on the why questions. An example might be their opinions on the customers’ impact on contractors’ business models, where one views it from a customer perspective while the other views it from a contractor perspective.

4.3 Comparisons to other studies

As mentioned before, Häggström et al. (2013) have studied the Swedish forestry service market and found that most contractors are mainly engaged in either silviculture or harvesting, which correlates with the results in this study. Their results also showed that the most common number of employees was 2-4 for harvesting contractors, where one-man contractors were most numerous among the silvicultural contractors and the variation in number of employees were bigger among silvicultural- than harvesting contractors, also similar to the results in this study. However, they also found that that almost one third of the contractors was what they called *occasional contractors*, defined as spending less than 455 hours/year in forestry work (25 % of a working year in Sweden), which does not match the results in this study. This can be explained in a couple of ways. It might be less common among *occasional contractors* to be members in the association of forestry contractors where the interviewee works, or the interviewees answers were generalisations of the contractor populations since the majority is not occasional contractors, or it could be that occasional contractors might be less common in the NPA area than in other areas of Sweden.

This indicates that to get statistically secured data the FBMC needs to be applied on a larger sample of contractors, but also that using contractors connected to an organisation might give a bias as the members might not be representative of the whole population of contractors.

According to several Swedish studies (Erlandsson, 2013; Ager, 2014; Eriksson, 2016) the customers have a strong influence on the conditions in the forestry service market. This supports the results in this study that revealed a strong customer influence in many of the conditions affecting the forestry service contractors' business model design.

There are also studies showing that business relationships between contractor and customer, and the working conditions provided by the customer, affects a contractor's profitability (Mäkinen, 1997; Eriksson, 2016; Eriksson et al., 2015, 2017; Erlandsson & Fjeld, 2017). This does not only show the strong influence the customers have on the contractor, but also reveals the great *responsibility* that customers have towards the contractors and the business conditions they operate in. The alternative to taking this responsibility in the existing norms of customer-contractor structures, would be to allow the contractors greater freedom in both management and execution of their services as well as in choosing machinery and varying e.g. pricing models. In order to foster innovation, such increased freedom could increase the contractors' incentives for development.

Ager (2014) claims that the customers in Sweden have largely used competitive pressure on contractors to lower their costs of forestry services and for driving the productivity development. This seems to still be very common since tenders combined with payments by piece-work rates are still extensively used in Sweden to purchase forestry services. The results of this study indicate the common use of competitive pressure by similar approaches of customer companies in all the studied countries. When applying such methods for purchasing and pricing, high competence and great responsibility of the service-buying customers must be strongly emphasized to retain the contractors' economic viability.

Morris et al. (2005) studied what components are most common to include in business models, and found that the *firm's value offering*, *economic model*, *customer interface/relationship* and *partner network/roles* are the four most common, in listed order. In the proposed FBMC the contractor's value offering can be found in *Services performed*, customer interface/relationship in *How services are sold* and partner network/roles are included in both *The customer* and *Use of subcontractors*. Thus, three out of the four most components listed by Morris et al. (2005) is included in the FBMC. The one that is not included is the economic model. No economic questions (except how services are priced) were included in this study, mainly because this study was applied on a service market level.

When applying FBMC on specific contractors, it could be suitable to include more economic aspects in the model. However, no component was included in all of the business models Morris et al. (2005) studied, and the FBMC model proposed here is thus no exception from the normal variation in the literature.

4.4 Future studies

It would be interesting to quantify the variety in the identified components in the business model. This could be done by a survey to forestry service contractors in the NPA areas based on the suggested FBMC components and questions. The proposed FBMC should also benefit of more extensive validating tests and evaluations within the intended service markets.

4.5 Conclusions

After studying the forestry contractors' business models in four different markets (Sweden, Finland, Scotland and Ireland) in the NPA-region, the following conclusions are made:

- This study indicates that the customers on all four markets have a very large impact on the composition of the contractors' business models, especially for harvesting contractors, which may hamper their innovation capabilities.
- There are many differences in the contractors' composition of business model components but the largest differences are to be found in the details of components' content.
- A structured tool that covers many aspects is required to capture and compare differences in the design of business models on a detail level, and for enabling uniform comparisons between contractors and markets. The Forestry Business model canvas (FBMC) presented in this study could work as such a tool.

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Appendix

Appendix 1: Interview guide

INTERVIEW GUIDE

Services performed on the market

What are the MAIN differences between the contractors, regarding the services they offer, the degree of specialization and their mix of services?

To what degree are the contractors engaged in forestry services? From purely engaged in forestry services to combinations with other business areas (e.g. agriculture, construction etc.)?

What affects the contractors' choice of service design: both internal conditions (e.g. competence) and external conditions (e.g. demand and customer requirements).

The customers

Who are the MAIN customers that buy forestry services (e.g. forest companies, private land owners)?

How does it differ in how many customers the contractors have (for different types of services)?

What affects the number of customers: the contractor's choice or other factors (e.g. customer requirements)?

How services are sold

What differences are there in how services are sold (e.g. long contracts vs. mission assignment, tenders vs. negotiation etc.)?

Why are forestry services sold in this way?

How services are priced

How are prices set (price per assignment, piecework rates or per hour)?

What can the contractor get paid extra for (e.g. quality, packet services)?

Machines and personnel

What is the variation in number of employees? Does it differ depending on the services the contractor offers?

Are they employed full-time or seasonal/temporarily? Does it differ depending on the services the contractor offers (e.g. full-time employment in logging and seasonal in silviculture).

Are the employees domestic or foreign (and does that differ depending on the type of services they offer)?

If they have machinery: How many is typical and what is the variation in numbers? How specialized are the machinery for a certain kind of service (e.g. final felling or thinning, or are they even specialized for logging?)?

What affects the choice of machinery: the contractor himself, uncertainty in demand, customer requirements, the contractor's economy etc.

Use of subcontractors

Is it common to cooperate with or buy services from other contractors (e.g. subcontractors or to broaden the service offering when needed)?

If so: is it long- or short-term arrangements?

How do they buy the services?